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There has been slight change in the price of sugar in New York for the past month, the quotation being 4 7-16 cents for Cuban centrifugals of 96 test. The European beet crop will not vary much from the estimates before published, which will keep the price about the same as at present.

Among our new ads in this month's issue will be found that of the Pelton Water Wheel Co. The Pelton is one of the best known wheels in the United States if not in the world and we believe is destined to be well known on these Islands; the Pelton people having already done some business on Hawaii, with, we understand, very satisfactory results.

A Horn Fly Remedy.—The best way of keeping horn flies away from cattle is to apply a mixture of kerosene and fish oil between the horns and at other points where the flies gather. One application every three or four days will be a great help. Any kind of stiff grease to which kerosene oil has been added will answer the purpose, and if well rubbed into the hair at the base of the horn need not be put on in very large amounts. —Ex.

Dr. Wiley says: "The whole science of vegetable physiology and chemistry teaches that sugar is elaborated in the leaves of the beet plant by the condensation of formylaldehyde, which is produced by the action of the chlorophlyl cell upon carbon dioxid and water. The beet itself has always been regarded simply as a storehouse, in which the elaborated sugar is conserved for the future use of the plant."

There can be no doubt that the cultivation of beets is being pushed in those states of the Union which have shown conditions favorable for it. And the beet sugar interest is bound to expand, wherever beets will grow well. The fact that the pulp of the beets is found to be the best feed for fattening hogs and cattle, furnishes a strong incentive to farmers to engage in the cultivation of what has been a neglected industry in America.

Many farmers are now discovering the mistake they have been making in attempting to feed fresh molasses to cattle. Serious intestinal complications follow, the resulting diarrhoea producing frequently just the reverse effect to that expected. Horses may be fed on diluted molasses, combined with peat and beet pulp residuum. To use sugar alone is a great mistake, and it should be used with great caution. The best results are obtained in fattening pigs.

A Jamaica publication says: "Budding the mango has been generally considered an impossibility, but this is a mistake, because it is done by experts in Florida, and it can be done by others when understood. The secret lies in taking the buds from about the middle of the growing shoot where they are well developed, and yet not too tender—where the color of the bark is just turning from green to purple—and at a time just prior to a vigorous stage or growth in the tree to be budded. The shield method has been used, but the ring or plate style would be better."

A Washington special says: Assistant Secretary Spalding has notified the Collector of Customs, at New Orleans, that special agents of the department, who investigated the subject, recommend as a means of preventing protracted exposure of samples of sugar to sunlight and air, first, that no samples be taken until the discharging of the sugar from the importing vessel has progressed far enough to furnish a number of samples of a mark sufficient to fill a can; second, that more suitable sampling cans than those now in use at the port of New Orleans be furnished.—Lou. Sugar Bowl.

Weather forecasts in America have become of great practical value. Prince Kropotkin tells that when a cold wave and a blizzard were expected in the West, 650 points in twelve

ranching States, as also all the railway and steamboat stations, and thousands of private persons were warned from the Chicago weather bureau. Immediately most ranchers took their flocks of sheep under shelter (200,000 head of sheep and cattle in one small spot), and masses of both sheep and cattle were saved from an almost certain destruction by an awful blizzard.

A Florida paper says: "The much talked of and dreaded water hyacinth has been performing a good mission this year. While the dry weather has deprived the woods of grass and made it so dry that in many instances it has burned over the second time, the hyacinth has been flourishing and furnishing good pasture to the thousands of cattle where the owners have had the foresight to transplant the bulbs in the inland lakes. Our markets have never been supplied with better home beef at this time of the year than now, and thus while everything else in the vegetable line is famishing for water, the hyacinth is rapidly multiplying and furnishing food not for the cattle upon the thousands hills, but those that are willing to wade for it. The experiment is well worth a trial wherever this plant will grow."

The total cost of producing sugar in the Usine St. Madeleine factory for the crop ending in 1898 was $12.83 per ton of all sugars. This includes about $3.50 per ton for transportation of canes, produce and stores by rail. The cost of manufacture alone (about $9 per ton) is about half what it was in any part of the West Indies fifteen, and about a third of what it was thirty, years ago. This does not bear out the statement made by a professed friend of the West Indies in an article in the Demerara Chronicle, that "All the time that the keenest intellects in Europe have devoted themselves to the improvement of the beet, the West Indian planter has, as a rule, been content to do very little." The work in the Trinidad Usine is perhaps better than in any other factory in the West Indies, but there are plenty of cases where results nearly as good are obtained.—Cor. Dem. Argosy.

Sugar, as is well known to most people, is not obtained solely from the sugar cane and beetroot, but from sources which would appear the most unlikely to yield any edible product. Take coal tar, for instance, from which so many beautiful dyes

are obtained. From the foul-smelling tar a very sweet sugar is obtained. In fact, so excessive are the sweetening properties of coal-tar sugar, that a quantity sufficient only to thinly cover a threepenny piece will suffice to sweeten a large cup of tea. Maple sugar is largely produced from the maple-tree. Sugar can also be made from the whey of the cheese vats. This whey is forced into large boilers, and after boiling for some time it is run into evaporating pans, where the boiling is continued until a thick syrup is left. After standing a certain length of time it is again boiled, when the sugar forms. The sugar is worked over till thoroughly drained, and is then packed in barrels for the refinery. It now resembles the ordinary brown sugar of commerce.—Trop. Ag.

With the present month of August, the cane crop of Hawaii for 1898-9 will be about all harvested, and the sugar shipped to its destination in California or New York. Some few estates on Kauai and Hawaii, which can grind all the year, are expected. It has been a favorable season for plantation work of all kinds, and the crop will exceed that of last year by twenty-five or thirty thousand tons. The Ewa mill is still at work finishing off its large crop of 22,000 or 23,000 tons; but the work after June is always greatly increased and set back, as the cane becomes tough and the juice more difficult to manipulate. The tail end of plantation work is often the most disheartening. The new Oahu mill has made a splendid commencement with its first small crop of 12,000 tons of sugar, which will be nearly doubled next year. Those who have examined it, and seen its work, believe it to be as nearly perfect as a sugar mill can be made. Both these mills are prepared to turn out 150 tons of sugar daily, and with no extra efforts.

The Queensland Agricultural Journal remarks that the most interesting point under discussion in relation to rubber planting in the British West Indies is a series of experiments now being carried on in London and Trinidad, by which it is proposed to secure rubber from year-old trees of the Castilloa elastica. It has been found that seed sown broadcast over a prepared field will yield an abundant crop of young trees, which at about a year old can be cut and sent to a factory where, with ordinary machinery operating a simple process, eight per cent. of fine rubber can be extracted from the young shoots. This can be done in the laboratory. It is claimed

that the process is a simple one, that but little machinery is necessary, and that in future the world's rubber supply will be secured from an annual crop of young trees sown on cultivated estates, and not from remote forests as at present. A series of experiments has shown that the young tree contains about eight per cent. of rubber, which would at present prices return an estimated profit of $200 to $400 per acre. The extraction of rubber from young shoots has been accomplished chemically in the laboratory, but whether it can be applied to the economic production of rubber on a large scale remains to be seen.

A Beneficent Insect.—Mr. James Mitchell, overseer of the Queensland Acclimatization Society, in his report presented at a meeting of the Council, states: "While at the garden of Mr. W. H. Parker, Glen Retreat, on 28th February, I made what I consider a very important discovery. A magnificent specimen mango is growing in his garden, and some twelve months since, or less, the tree was very bad with the common wax scale and the woolly blight. For sometime it had been noticed that the tree was getting cleaner, the scale and blight falling off. On examining the remaining scale, a true gardener's friend, in the shape of a natural scale enemy, was found. The insect is almost too small for the naked eye to discover unless attention is drawn to it, or by the aid of a microscope. The insect resembles a small beetle that it fed on red spiders. If Mr. Tryon can identify the red spider-eating beetle and the scale and woolly blight enemy as one, then we have found a ladybird, that deserves protection of all interested in plant life, and especially orchardmen. On closely examining a tree that was cleaning itself in the society's gardens, Mr. Mitchell found the same little ladybird at work, which attacks the scale in a most active and fierce manner, working unceasingly until it forces an entrance at one side of the scale, where it enjoys itself in devouring the young scale. The larva is found killing and devouring the young scale in the same manner. As in the adult stages the larva finds its way between the leaf and the woolly blight and when a large number of these little gnats or larva gets on the smutty or scale-infested leaf, the transformation is soon made manifest.—Exchange.

THE CHANGES IN SUGAR WHILE STORED.

There is not a person interested in sugar that has not realized that it has no great keeping qualities. The editor of the "Sugar Beet," some years since, concluded to make a unique collection of all beet sugar made in the United States. These were placed in sealed jars and every possible precaution was taken to eliminate the air. After a few years these sugars had not the same appearance; their color was lighter or darker as the case might be, etc. The subject of these changes has been seriously discussed in Continental Europe, and we shall simply call attention to some few of the conclusions reached. It is very essential to thoroughly cool the sugars to be kept before placing them in the warehouse, the selection of the building, its position as regards to wind and moisture must not be overlooked. The low grade products that had been stored cold and alkaline after end of campaign were subsequently found to have undergone considerable change. A certain percentage of the sugar had inverted and the mass was warm. It became necessary to dilute these products in the second carbonatation juice in order to eliminate the inverted sugar formed during keeping. The storage rooms should be scrupulously clean and dry. If sugars are placed in warehouse when still warm they change color after a few days, but if previously sufficiently cooled they retain their original color. It frequently happens that manufacturers, by overlooking these details, are in the end the losers. Sugars made by identical processes, but handled differently, undergo changes absolutely different. The most desirable method for cooling sugars as they leave the centrifugals is open to much discussion, several devices having this in view are used in the beet sugar factories and shall be the subject of a future article.

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The flag of the United States represents more and is responsible for more than was dreamed of less than two years ago. It is the emblem of a nation greater than its founders imagined, or even the present generation regarded within the range of possibilities—in wealth leading all other nations; in enterprise, second to none; in lofty purpose, at the head, wielding at the peace conference at The Hague an influence for universal peace as great as that exercised by any other world power.—American Grocer.

A CANE PLANTER.

An invention that will effect a radical change in the methods in vogue of planting sugar cane has just been perfected and put into successful operation by Capt. John A. Aniello, already well-known for many ingenious discoveries in the field of mechanical science. The captain overheard a remark some time ago made by a wealthy sugar planter to a friend, "If we planters can get a machine to plant cane, so as to economize labor of man and beast, we will pay a good price for it, and there will be a fortune for the inventor."

This casual word set the captain's brain a thinking in the direction of a machine on the labor-saving principle. To think and act are one and the same thing with Captain Aniello. So he drew his plans and specifications and in a few months the machine was a matter of fact. He showed it to Colonel John T. Moore, the prominent sugar planter who immediately saw that there was something in the invention, and forwarded it to one of his plantations in Terrebonne parish, and gave it a thorough trial.

The result of the experiment was entirely satisfactory. Colonel Moore wrote to Captain Aniello in this vein:—

"Dear Captain Aniello—I certify that the machine is a success. Only if it was made larger, it would help two men and the driver and four mules to do the work which ordinarily would take nine men and nine mules on one day's labor on my plantation."

This certificate was countersigned by Mr. Bertrand, the overseer of Colonel Moore's plantation.

Acting on the advice thus given, Captain Aniello sought Messrs. Muir & Fromherz, contractors and builders, and engaged their practical experience and interest in the matter and to help him in building an improved machine.

The invention consists of a wagon sixteen feet long and seven and a half feet wide and two and a half feet deep, divided into two lengthwise compartments by a feeder, which in the middle, is fitted with a drum over an opening destined to drop the seed cane. At one end of the trough, or feeder, is a hopper for dropping fertilizer. The front of the wagon, near the ground, is provided with two plows so arranged as to dig the furrows for the cane, and after the fertilizer and the seed cane have been dropped into the furrow, the earth on

both sides is nicely and evenly thrown back over the cane by a very ingenious arrangement fitted to the rear of the wagon.

Two men to feed the cane into the "feeder," one driver and four mules are all the manual labor and all the motive power needed.

The wagon which Captain Aniello had originally made was twelve feet long and six feet wide. Acting under the suggestions of Colonel Moore, he is building and has nearly completed a large wagon, which will do all the work expected of it and revolutionize the system of cane planting.

A number of wealthy planters who witnessed the first trial on Colonel Moore's estate in Terrebonne parish have written to Captain Aniello and placed orders with him for from four to twenty-five such wagons. The carrying capacity of the wagon will be two tons.—New Orleans Picayune.

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CONCERNING TRUSTS.

"A trust," says Chauncey M. Depew, is a combination of capital to do business on a large scale, to meet the keenest competition ever known. If John Wanamaker does $100,000 worth of business a day he can make money on a profit of one-tenth of one per cent. A man who does only $1,000 worth of business a day could hardly more than grease the hinges on his front door with such a profit.

"There are several kinds of trusts, and some of them are innately bad. This feature can be eliminated with little trouble, if the people want it done. It would only be necessary for a study of these combination movements to be made, and then for the people to withhold their patronage and support from those which are found to be unworthy of support. This is a simple matter. If the banks would refuse to handle their certificates and the people refuse to purchase their stock or bonds, nothing would be easier than to wipe them out of existence. Such unworthy organizations are fostered for the purpose of gathering money on plants on which they have spent nothing, and if the true inwardness of many of them could be found out they would not be allowed to exist."

James G. Batterson, a well known financier, defends the corporate systems and backs up his opinions with facts gained by broad experience and keen observation. He shows how they have hastened civilization, benefited the laborer and elevated the standard of social living. He opens by giving a

general definition of what a corporation is, but reserves for consideration only such corporations as are organized for commercial purposes, primarily for profit and secondarily for the convenience of the public. He describes the organization and working of the Standard Oil Company, how in 1859 kerosene was made from coal, but it was so dear that the great majority were excluded from using it. Rockefeller was so poor when he entered the business that he was compelled to ask for a loan from a Chicago bank, but the directors not being satisfied with the experiment he was about to make, refused to lend the money, so that the president of the institution made the loan himself. Success crowned Rockefeller's efforts, and as a result of his business ability the Standard Oil Company has come into existence, and the world is now getting kerosene so cheap that it is within the reach of all.

The claim is made that small producers were driven out of business by this much denounced monopoly, but the fact is, said Mr. Batterson, that the complaining public bought Mr. Rockefeller's oil because it was cheaper and better than any other, whereas, if they had practiced what they preached about the small producer, they could have kept him in business by purchasing his product. The only monopoly the Standard Oil Company has is Rockefeller's brain.

Rockefeller, when a lad, had been employed in a coal oil refinery, and discovered a method of refining coal oil which he believed would be a great improvement; but he had no means to put his discovery to a test until the assistance referred to above was secured. In addition to this, he learned that a new scheme had been devised for conveying the crude oil from the wells through pipes over hills and across valleys, by which it could be delivered at tide water at a tithe of the expense of conveying it in tanks by rail or boats. Three men owned the patent for the new mode of conveyance and he sought and with the assistance of friends secured the patent. By this means the crude article was conveyed hundreds of miles from Pennsylvania, Ohio and other western States to new refineries erected at tide water in Delaware or New York, and he was able to place the oil refined by a new process, which made it more pure and less dangerous for domestic use. This process has been improved from year to year till now the oil that is refined by his process is the safest, cheapest and best illuminant extant for domestic use of any known. The price was steadily reduced for several years after it came

in his hands. This, we believe, was the original trust, and it has maintained its position under its original character till lately it has organized under the New Jersey laws. The success which has attended the oil and sugar trusts has stimulated the organization of hundreds if not thousands of similar organizations, some of which are mere schemes to gull the many. Some of the later trusts are simply wild cat schemes to obtain the money of people who have saved a part of their earnings. No one should go into a trust of any kind without a perfect guarantee of honesty is secured.

The events of every day, says an exchange, demonstrate that organized industries or combinations of capital can not and do not escape competition.

Quite recently a watch company with a capital of $10,100,000 was incorporated in New Jersey, with the officially declared object of entering the field of competitive manufacture and sale at once.

The late president of the Liggett & Meyers Tobacco Manufacturing Company, St. Louis, Mo., is organizing a new company to enter into competition with the Tobacco Trust, and has announced his intention to build one of the largest factories in the world, with the most modern appliances.

Any further consolidation of the sugar refineries will invite fresh competition. In fact, there are already two large syndicates formed to start new refineries the moment the present trade war is stopped.

The war of the rival gas companies in New York has reduced the cost of gas to 50 cents per 1,000 cubic feet! while all incorporated gas companies are sure to come into competition with gas manufactured and sold by municipalities.

On general principles, any line of trade or manufacture that is conducted upon a liberal margin of profit is bound to attract competition. The result to consumers is lower prices and better average quality.

As proof of the above statement, take the war between the big coffee roasting interests, which already has saved millions of dollars to consumers; the sale of refined sugar at less than the cost of production; the low cost of refined oil; cheap matches; cheap labels; cheap crackers—in short, the effect of organized capital has been to make the present a consumers' millenium.

The bulk of the saving wrought through every new improvement, patent, or process is given to consumers. Their

demands are imperative and loud, and bound to be heard and obeyed, and no combination can deprive them of equitable rights except temporarily.

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MR. HAVEMEYER CRITICIZED.

Hon. Henry M'Call, Congressman from Louisiana, expressed himself as follows regarding Mr. Havemeyer's statement to the congressional committee: "I had seen Mr. Havemeyer's extraordinary statements in the public prints, and am at a loss to understand his motives, unless it be spite, and the desire of the American Sugar Refining Co. to get rid of Louisiana and the Western beet sugar industry, natural competitors of the Trust.

It would seem that Mr. Havemeyer, in his anxiety to divert the attention of the public from trusts per se, went out of his way to attack Louisiana and the West, who stand as the only competitors of the Sugar Trust lowering the price of sugars to the American consumer.

Mr. Havemeyer makes the broad statement that "The mother of all Trusts is the Custom's Tariff Bill." This statement is easily controverted. The greatest Trust of the country, the Standard Oil Co., does certainly not owe its existence to any protection received from the tariff. There are many industries in the United States not specially benefited by protection that are in Trusts, and public statements to that effect have been made in the newspapers.

Sugar refining, according to Mr. Havemeyer, did not receive sufficient protection by one-half, and yet the American Sugar Refining Co. must necessarily be the offspring of the tariff, if the Mother of all trusts is the Custom's Tariff Bill, and they control the American markets to the extent of manufacturing nearly 90 per cent of the refined sugars.

The establishment of the Arbuckles, Doschers, etc., in the sugar refining business, has caused a great sugar fight, and refined sugars have probably been selling for many months below the cost of production. It is quite likely that one-eighth of a cent protection to refined sugar is not sufficient, and that one-quarter of a cent would be nearer right, but Mr. Havemeyer has no business to conclude that twenty per cent protection is sufficient for any and all industries of the country, and that any higher duties must necessarily produce Trusts.

Even with the protection afforded now to Louisiana and

Western beet sugars, these industries have hard work to compete against the semi-slave labor of the tropics, and against the cheap skilled labor of Europe. And yet, with this protection, so unnecessary, according to Mr. Havemeyer, there is no Trust and never can be among the producers of cane or beet sugars in the United States.

Mr. Havemeyer makes the gratuitous and utterly outrageously, false statement, that the United States Tariff Bill puts into the pockets of a few Louisiana sugar planters $10,000,000 annually on the crop of 250,000 tons. The sugar industry of Louisiana is the mainstay of the state; it employs over half a million of people directly and indirectly. Over $100,000,000 of capital is invested in the cultivation of this staple; 200,000 acres of land and 400 factories are required to turn out from three hundred to three hundred and fifty thousand tons of almost refined sugars, which, for over two months supplies the wants of the American people.

Need I say anything of the great and growing beet root sugar industry of the Western States. Millions of capital are being invested in modern plants, thereby encouraging the farmers to put their lands in beet culture, promoting diversification of crops, and ensuring higher prices for wheat, corn and oats, the employment of large numbers of skilled men—engineers, mechanics, chemists, sugar makers, etc., opens up new fields, and keeps busy the iron, steel and other manufacturing plants of the country.

The interstate trade created by the Louisiana sugar industry alone has been estimated at $50,000,000. We raise scarcely anything but the sugar cane, and purchase nearly all our supplies of meats, grain and clothing from the East and West. A great deal of machinery comes from the East, and all our coal, mules, cooperage, lime, etc., are purchased from many of the Eastern and Western States.

The sugar producers of this country, both in the cane and beet industries, would be entirely destroyed with a protection of twenty per cent, which Mr. Havemeyer says is sufficient, and then the consumer would be entirely at the mercy of the refiners. What they want is free raw sugars and a duty sufficient on refined to protect them against foreign refined.

The American people have always been fair minded. Protection has given the country great prosperity, and they will not be so blinded by animosity against Trusts as to destroy

the goose that laid the golden egg. Protection to all American industries should be the motto of all patriotic citizens.

Sugar producers, sugar refiners, and every other industry needing protection against the cheap labor and cheap capital of the world should and will receive fair and adequate protection, and our country will continue to prosper, and in the course of time produce all the sugar and every other article needed for the use and comfort of our growing millions of population.—Louisiana Planter.

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OXNARD VS. HAVEMEYER.

Henry T. Oxnard, President of the American Beet Sugar Association, has prepared a reply to H. O. Havemeyer's recent argument before the Industrial Commission at Washington, in which he denies some of Mr. Havemeyer's statements, and accuses him of seeking to destroy the American beet sugar industry, in order to foster the refineries that handle foreign raw material, besides attempting to divert public attention from the Sugar Trust by attacking the tariff. Mr. Oxnard says:

"The two largest—in fact, the pioneer—trusts in the country, as every one knows, are the Standard Oil and Sugar trusts. The Standard Oil Company does not enjoy its monopoly from the tariff, and the American Sugar Refining Company, according to Mr. Havemeyer, receives only 3½ per cent. protection. How absurd, then, is it to say the tariff is responsible for trusts."

Mr. Oxnard declares that American sugar producers would suffer and the development of the beet sugar industry be retarded by the admission of raw sugar free of duty. "If," he says, "Mr. Havemeyer had said that keen and losing competition in business led to the formation of trusts, he would be right, for the tariff has nothing to do with the formation of trusts."

It may be tariff is not the "Mother of Trusts," but it cannot be disputed that the abolition of the heavy duties now imposed on sugar, tin plates, matches, and other articles, would, if removed, prevent trusts from exacting more than a fair profit and insure the people fair competition.

In 1879 the late Theodore A. Havemeyer, in a statement to the Committee of Ways and Means of the United States House of Representatives, bearing upon the tariff on sugar, said:

"And first, I would say that my view of legislation in this, as in every other matter, is that the first party to be considered, and whose interests are to be protected, is the people at large. * * * The prime aim of legislation should be the protection of the consumer. Now, how in the matter of sugar would the interest of the consumer be best legislatively protected? Clearly by the enactment of such laws as will secure to him at least the possibility of procuring the best sugars at the lowest price. In the present instance that end could be most certainly and speedily attained by the abolition of all duties on sugar." Theodore Havemeyer was without a peer in his knowledge of the sugar business. His firm in the past and the Trust in the present has always worked on the policy that he serves his interest best who serves the public best. His brother, H. O. Havemeyer, put an end to the bonanza in coffee which the Arbuckles enjoyed for years, and by competition has given the people the cheapest coffee and best value for the money ever known. A ten-cent pure coffee means a beverage costing five cents per gallon, or about one mill per cup. He stated before the United States Industrial Commission that in his opinion Cuban sugar should be brought in free of duty, and that this course would bring refined sugar down to three cents per pound.

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SUGAR BOOM IN HAWAII.

[In the Washington Star of July 1, is printed an interesting letter from that paper's Honolulu correspondent, giving information regarding two of our new sugar plantations, that has not appeared in print here. Portions of the letter, of no local interest, have been omitted.]

The one subject most absorbing here to public and private attention for the past two months has been the rise in prices in sugar plantation stocks and how to get some share in the great profits. Since annexation, nearly a year ago, the average prices of such stocks have advanced fully 100 per cent. There were then about sixty separate plantations, whose united value at a conservative estimate was twenty-five millions. Since then, in less than a year, $25,000,000 more has been added to the market value of these properties, mainly in consequence of the annexation of these islands to the United States.

This means that a considerable number of persons have realized large profits, all within a very few months. As a

consequence, an excitement arose six or eight weeks ago and prices of some favorite plantations advanced by leaps and bounds to an inordinate degree, followed by rapid shrinkage. In this oscillation of prices, many persons became sadder and wiser, and the prices, still high, have gone back to more reasonable limits.

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The new Kihei plantation is located on Maui Island, next south of the famous Hawaiian Commercial, or Spreckelsville. It contains about 4,000 acres of first-class land below the 400 feet elevation, well available for irrigation by pumps. Copious supplies of water are found at sea level. This is not from artesian wells. Large pits are excavated to below the sea level some distance inland. From the bottom of the pits a number of drifts are run horizontally inland for several hundred feet. Thus from a single pit enough million gallons are daily yielded to water from 500 to 800 acres. A conservative estimate of the annual crop of Kihei is 12,000 to 15,000 tons. The president is H. P. Baldwin, who is the leading owner of the adjacent Hawaiian Commercial. Under Mr. Baldwin's experienced direction the latter concern has begun an immense development of its resources. Baldwin and his associates a few months ago contrived to get hold of a majority of the $10,000,000 of the Hawaiian Commercial stock at 45 per cent. It has since gone up to 105, a gain of about six million dollars to the fortunate shareholders. This advance is mainly due to the improved management of the successful Baldwin, in which advantage Kihei shares. A leading element in this development is the use of wells such as are being dug at Kihei, thus bringing under culture some 10,000 splendid acres otherwise useless. Of the farther extension of sugar culture in Hawaii on arid lands by the means of irrigation from wells by steam pumps, it is difficult to say where the limit is.

It remains to describe an immense concern which has just been started at Olaa, on the Volcano road. That is the famous coffee district, until lately so promising. It is now suddenly absorbed into a monster sugar plantation. Of late the coffee growers have suffered much discouragement from the continued decline in the prices of coffee, and from the disappointments always encountered by the inexperienced undertakers of a new business. They have been glad to sell out to the promoters of the new plantation at prices for their lands which substantially reimburse their expended capital and la-

bor. So thousands of acres of flourishing coffee trees are being pulled up, and the ground plowed for cane.

The Olaa sugar promoters have secured, mostly in fee simple, about 20,000 acres of land suitable for cane culture. Perhaps half of this is heavily timbered, one-fourth open country and one-fourth in coffee clearings. The greater part is a superb quality of deep soil underlain by porous clinker lava, which gives a perfect natural drainage. The rainfall is excessive—some 200 inches per annum—but no standing water accumulates. The soil is a layer of volcanic ashes ejected at a recent period from the Kulani cone near Kilauea. The timber is Ohia or Eugenia, about thirty trees of large size to the acre, of no value as lumber and easily cleared, the interspaces being occupied mainly by giant tree ferns. A supposed objection to half the land is its altitude, being over 1,200 feet above sea level, a height usually unfavorable to the rapid growth of sugar cane when exposed to the cold trade winds. But in the whole of this region the trades bank up against the two loftly inland mountains in such manner as to force precipitation of their moisture. This sets free great stores of the latent heat of the vapor and raises the temperature. Thus the mercury is kept exceptionally high, and everywhere in Olaa sugar cane flourishes well up to 2,500 feet of altitude.

Besides these superior qualities of soil and moisture, Olaa will enjoy easy transportation to the excellent seaport of Hilo. A railway is already undertaken to connect Hilo with the mill site, ten or twelve miles away. The grade will be about 100 feet to the mile. Transportation of cane to the mill will doubtless be by the cheapest method, that of fluming. Although streams and ponds are lacking, there is no doubt that ample supplies of water for fluming can be obtained by means of short tunnels or drifts into the underlying lava. In the much drier district of Kau this means of getting water for fluming is successful. It may be asserted beyond contradiction that there is no plantation in these islands so favorably situated as Olaa for the cheap production of sugar. In present lights, it seems strange that its adaptation for that purpose has so long been overlooked. One reason of this has been its supposed unfavorable altitude. Another has been the inaccessibility of the tract. It is the impetus of the recent boom that has led to its discovery.

This monster plantation has been incorporated with $5,000,000 capital. The promoters pay for the lands and make their

profit out of their half of the capital as paid-up stock. The assessable half is sold to pay expenses of planting, machinery, etc., until dividends shall be paid three years hence. The $2,500,000 of assessable stock was sold last week. Twice the amount was subscribed during the three days allowed.

It is a source of gratification to see so promising a development of Hawaiian resources. At the same time a keen disappointment is felt at this severe check to the development of the coffee industry. That industry was far better adapted than sugar to create a population of white settlers. We had looked forward with great hope to the growth in Olaa of a large and prosperous community of white families, maintaining themselves by the production of coffee.

Still we cherish the hope that many of these white farmers of Olaa will remain and engage in a successful and profitable cultivation of sugar cane. The new company will give them every encouragement and assistance to plant cane on shares. It is for the interest of the company to do this as a source of labor supply which is certain to become scarce. That the white farmers would be successful in such undertaking is indicated by the great actual success of those who have gone into that business on the great Ewa plantation. Their cane is reported to be averaging higher yields than those of any other part of the same exceptionally fertile fields.

The labor question looms up as a very serious one in the near future. At present Japanese laborers are being imported in large numbers under contract. Next year when Congress shall have put in force the American laws, contract labor will no longer be permissible, and it is improbable that unassisted laborers can find means to immigrate. Portuguese immigrants would be under the same disability, in addition to the greater expense of importing them from the Atlantic. It is nearly certain that it will become necessary to much increase the wages paid, in order to obtain the labor of the large floating population of Chinese and Japanese. There are probably 20,000 such Asiatics in the islands who are without constant employment. High wages would probably tempt them to engage in plantation labor. Better housing than the present comfortless and crowded barracks which are too common would probably be an additional inducement.

We are strongly in hope, however, of securing a considerable immigration of white farmers to engage in plantation work on shares as stated above. It is believed that excellent

inducements can be given to secure desirable immigrants of this better class. These persons would not perform themselves all the labor required, but would employ more or less of Asiatic laborers under their direction. The margin of profit in making sugar is large enough, in any case, to allow of an increase upon the present rate of wages.

You will ask whether the present general rise in plantation values is mere inflation, or if not, upon what good grounds it is based? I answer that it is largely based upon our political stability resulting from the attainment of annexation. Our present position is one of political security as compared with previous insecurity and uncertainty. Our sugar profits had long been large—giving dividends of 20 to 40 per cent. upon capital. But no one could tell how long they were likely to continue. Another and transient ground of encouragement has been the recent great advance in prices of sugar, resulting from the destruction of the crop in Cuba. A conservative estimate of future prices of sugar and cost of production seems to assure an average permanent income of from 8 to 10 per cent. to the holders of plantation stocks bought at the present advanced prices of the leading stocks. For these leading plantations there is now a large demand for shares arisen not only in California, but in Boston and New York. This foreign demand for our shares assists to keep up the market prices.

Honolulu now has a regular stock exchange, with fifteen seats at $3,500 each, and daily printed prices.

Our increase of ocean steam traffic has been as follows: In four months of 1898 arrivals were 51; in four months of 1899 arrivals were 92, showing an increase of 80 per cent.

In '98 five were warships and forty-six merchant vessels. In '99 sixty-six were merchant steamers and nineteen United States transports. Thus the increase of our mercantile steam marine in one year has been 43 per cent. This betokens a great commercial future near at hand for Honolulu. Meantime the growth of our city is advancing with great strides.—"Kamehameha," in Washington, D. C., Star.

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The American Sugar Refining Company is unquestionably entitled to fair consideration at the hands of the National Government, and it can do but little good for its own cause by attacking the domestic sugar industry of this country, which ought to and will survive on its merits, while the exaggerated claims of Mr. Havemeyer may turn the tide of opinion against him.

SUGAR REFINING AND TRUSTS.

Testimony Given by H. O. Havemeyer and Others Before the Industrial Commission.

Henry O. Havemeyer, president of the American Sugar Refining Co., was examined by the Congressional Industrial Commission in connection with its investigations of trusts. Mr. Havemeyer in his statement said:

"The mother of all trusts is the custom tariff bill. The existing bill and preceding one have been the occasion of the formation of all the large trusts with very few exceptions, inasmuch as they provide for an inordinate protection to all the interests of the country, sugar refining excepted. Economic advantages incident to the consolidation of large interests in the same line of business are a great incentive to their formation, but these bear a very insignificant proportion to the advantages granted in the way of protection under the customs tariff.

"There probably is not an industry that requires a protection of more than 10 per cent. ad valorem, and it is to obtain what is provided over such percentage in the tariff that leads to the formation of what are commonly spoken of as trusts.

"With a protection to an industry not exceeding 10 per cent. all menace to the community of trusts would cease. This 10 per cent. would represent the difference in cost of production, and likewise act as a protection against surplus products of foreign countries being dumped in our local markets, thereby interfering with the regular and economic working of our industries. Any advantages that might then accrue to such combinations they would be entitled to, and the public would not be damaged thereby, as any expansion of price would be met by foreign competition and relief.

CLAIMS SUGAR IS NOT HELPED.—"I have said that sugar was an exception. The rate of protection on sugar is one-eighth of a cent per pound, which is about three and a half per cent. ad valorem, and it is not the difference in the cost of refining between this and foreign countries. The least it should have is eight per cent., or, in specific figures, one-fourth of a cent per pound. The sugar refining industry of this country, no matter what form its organization, is entitled to adequate protection, if any industry is.

"There are at least 100,000 people dependent upon it. What

it pays or has paid to its stockholders in the past represents nothing more than a fair return on the capital invested, considering the extent of the business.

"The United States tariff bill, in assessing about $40 per ton duty on imported sugar, pays into the pockets of a few Louisianans on their annual crop of 25,000 $10,000,000; to the Hawaiian islanders, probably represented by 150 foreigners on their annual crop of 250,000 tons, $10,000,000; say 100,000 tons purchased elsewhere in the United States, $4,000,000.

"Here you have $24,000,000 extracted from the people of the United States for the sake of getting the revenue which $40 per ton on foreign sugar provides. This is merely illustrative of the whole tariff—every line of it—and its effect upon the people. In fact, the tariff bill clutches the people by the throat, and then the Governors and the Attorneys General of the several States take action, not against the cause, but against the machinery which the people employ to rifle the public's pocket.

DISTINCTION IN ROBBERY.—"There appears to be in the public mind a distinction between robbery by an individual and that by a corporation. What is commendable in an individual appears to be dishonest in a corporation.

"I maintain that it is immaterial to the public in what form business is done—whether by an individual, firm, corporation or even trust. There are merely forms of conducting business, or, in other words, machinery for the operation of business. It is the duty of the Government to see that under the tariff laws they enact this machinery cannot, in its actions, result to the detriment or impoverishment of the public.

"It would have been very easy and proper for the Government to have put a corresponding internal revenue tax on sugar simultaneously with the imposition of the customs duty and have these $24,000,000 which now go into the pockets of a few individuals go into the treasury for the benefit of the whole people. If no expenses in the Government needed to be provided for, and protection to American industries was desired, the imposition of 10 per cent. ad valorem on all manufactured products would have settled the matter. There is every reason why, if revenue is desired, that with a duty on raw materials of foreign production, a corresponding internal revenue tax should be levied on similar products, and the

protection of manufacturers thereof limited to an additional 10 per cent.

"I repeat that all this agitation against trusts is against merely the business machinery employed to take from the public what the Government in its tariff laws says it is proper and suitable they should have. It is the Government, through its tariff laws, which plunders the people, and the trusts, etc., are merely the machinery for doing it.

SAYS CONSUMER HAS BENEFITED.—"The statements made before the committee in Congress and the speeches against the sugar refining company are absolutely devoid of truth—utterly unworthy of credit. The intention of Congress, however, to enact something into law contrary to what the sugar refining industry properly required resulted, irrespective of the great injury and injustice done, in the passage of the existing sugar schedule.

"Whether the sugar refining company has been a benefit or injury to the community can be best expressed in a table showing the prices for a considerable period prior to the formation of the trust and for a corresponding period subequently. The difference since its formation shows an advantage to the consumers of over ⅛ of a cent per pound.

"What the sugar company has disbursed in dividends has been not because of any extreme protection under the tariff, but out of conditions perfectly legitimate and commendable. Their record shows conclusively that no advantage has ever been taken of the company of any protection in excess of the 8 per cent claimed, i. e., ¼ cent per pound, under the tariff."

"Tariff laws should not afford protection exceeding 10 per cent to any industry, so that, irrespective of the form of doing business, individual or corporation, the people, that is the consumer, would be protected. As the tariff laws are and have been it is the consumer, i. e., the great mass of the people, who has terribly suffered, to the great advantage of the few of the business community.

"The sugar company undoubtedly tries to do its utmost to enlarge its business, but does it in a way which they consider the only proper one, i. e., by making the price so low as to defy competition.

"TRUE COMMUNISM OF PELF."—"It is my opinion that corporations are under no obligations whatever to any of the States for their existence. Quite the reverse. The States are under obligation to them. If the plant of these industries

consolidated was capable of being put on wheels and moved from State to State, you would find very active bidding for them. It is not an unusual thing for certain localities to guarantee free taxation for 20 years, free water, and in some instances give the land to corporations to have them organize under their statutes and locate in their States.

"Hostility to capital meets with its own condemnation. This is illustrated by the situation in New York, where a discrimination against capital has prevented its employment and driven it elsewhere, resulting in a greatly increased tax rate, and a tendency to increase the number of the unemployed.

"All I have to say about trade organizations and strikes is that, without violence, they are natural. They have one objection, however, their tendency to reduce all labor to a low level.

"Business is not philanthropy. Capital and labor will adjust their own relations if they are let alone. Interference always operates against one or the other. That means to the disadvantage of both.

"There is no such thing as monopoly in these days except that which results from patents and copyrights.

"The true 'communism of pelf' is the customs tariff bill. It says to the people: 'Here is the law we have enacted for your robbery. Do not complain of it, but do your utmost to attack and injure the machinery engaged in extracting from you what we legislate shall be taken from you.

" 'Keep up the clatter while the voters on the tariff bill take advantage of the noise to enact laws that cause your impoverishment and thus contribute to the greed and avarice of the few.'

"Illogical Hostility."—"There is a prevailing hostility to wealth.

"This is perfectly illogical. Everyone wants money. It is the abuse of money, not its possession, which is opposed to public interests.

"This hostility finds its outlet in hostile legislation, in unequal and unjust taxation. All this is probably natural. It is directly against the interest of the very class, I mean the poorer class, which it is supposed to benefit.

"Corporations, whether directly such or in the form of trusts, are an expedient for uniting the interests of a large

number of persons of smaller means into a large aggregation of capital.

"Attack upon them is, therefore, an attack upon their stockholders. In the case of many well conducted corporations these stockholders are very numerous, and are often persons of moderate means, dependent upon their income for their support.

"In the absence of all disturbing causes, the direct tendency of a combination of capital is to promote economy, reduce expenses and diminish price.

"This does not mean that a person having anything to sell will not get for it the largest price that he can. It means that with the abundance of capital ready for investment, which is always found everywhere, the only way to prevent competition is to keep prices below the competitive point.

"Great public improvements, factories and other enterprises requiring large capital either are impossible, unless through the instrumentality of corporations, or are possible only through the action of individuals themselves possessed of unlimited capital. It is easy to see what in the latter case would happen to the community.

"One form in which hostile action manifests itself is by legislation which is intended to keep corporations and their products out of particular States.

"This legislation in some States takes the form of bills which permit citizens to buy goods and with impunity refuse to pay for them. This is a premium on dishonesty.

"In other States the attempt is to exclude articles which are of prime necessity. If the producers of such articles were to follow the lead and combine to keep their commodities out of the State, it is easy to see what would result, i. e., either the people would be compelled to go without, or they would be forced to pay an inordinate price.

Two Forms of Monopoly.—"Trade will always take care of itself. If it is left to pursue ordinary channels A will see to it that B does not have any extraordinary advantages. It is only when the State interferes that a situation is created by which advantage can be taken against the interest of the community.

"In these days there are two forms, and only two forms, of monopoly, one of which results from a patent and copyrights. It is universally recognized that this is in the interest, not

against the interest, of the public. The other, that which comes from unfair tariff discrimination.

"Tariff for revenue need not be considered. The expense of the Government must of course be provided for. Tariff for the purpose of equalizing against foreign bounties or foreign discrimination does not need to be justified. Beyond that there is no excuse for giving to one industry a protection of 100 per cent as against four per cent for another, or any more than 10 per cent.

"The result is that the Government fleeces the community at large in the interest of some favored industry.

"It must be kept in mind that this is a rich country, not a poor country.

"It must be kept in mind that the object of everyone is to make the country stronger, wealthy, more important, more influential. The hostile action to which I have referred, legislation against corporations, if followed to its legitimate results, would make the country less powerful, its people less prosperous, and would destroy the influence which comes from the richness of the land and its people.

"Citizens are divided into two classes—the industrious and those who wish to live on the industry of others. It is they who are without capital and who are hostile to it. This is only another mode of stating the obvious proposition that it is those who are without means who wish to have it without work."

James H. Post of Brooklyn, representing the Mollenhauer Sugar Company and the National Sugar Company of New York, testified that the margin between raw and refined sugar had fluctuated with the revision of the tariff and the entrance of competing companies into the field. The standard price of refined sugar, he said, was fixed daily by the American Sugar Refining Company, and as a rule these prices were followed by the independent refineries.

As a general proposition, Mr. Post said he thought the American Sugar Refining Company had influenced conditions for the good of the country.

"Do you think?" asked Mr. Ratchford, "that it would be a good thing for the American company to be in entire control of the field?"

"No," said Mr. Post, "I think the entire control of an article of universal consumption in the hands of any one set of men would be a very dangerous power."

"That is what the trust aims at," said Mr. Ratchford, "according to Mr. Havemeyer's own statement."

"The business might get into the hands of men not so broad-minded as Mr. Havemeyer," replied the witness.

Mr. Post denied that either the National or the Mollenhauer companies were connected in any way with the American Refining Company. At the present price of raw sugar, the margin between raw and refined, he said, is 63 cents per 100 pounds before the refiner begins to realize a profit. In past years his refineries have used Cuban cane sugar almost altogether, but since the great reduction in the Cuban output they had been forced to rely largely on European beet sugar, principally German and Austrian. The European refined sugar is cheaper to produce than the American, but not of so good quality. Of imported raw sugar the American refiners have gotten large quantities from the Philippines.

Regarding the effect of the sugar trust on the price of raw sugar, witness said he thought the presence of one great buyer in the field had tended to keep down the price, but he did not think the trust could keep down the price more than 1-16 of a cent per pound, and that during only a portion of each season.

On inquiry as to the affidavit plan of selling to wholesale grocers, witness said that it had recently been abandoned. The result is that in many places grocers are cutting the price of sugar and selling at a loss. Mr. Post said he was sorry for the grocers, but it was a matter of little interest to the refiner. The refiners allowed the grocers a profit of 3-16 of a cent per pound, which was as little as they could afford to handle it for.

Free sugar from Cuba, witness said, would wipe out American raw sugar, both beet and cane, in the next five years.

Henry T. Oxnard of San Francisco, president of the American Sugar Beet Association, has prepared a reply to H. O. Havemeyer's recent argument before the Industrial Commission at Washington. He denies many of Mr. Havemeyer's statements and accuses that gentleman of seeking to destroy the American beet sugar industry in order to foster the refineries that handle foreign raw material, besides attempting to divert public attention from the sugar trust by attacking the tariff.—New England Grocer.

WIRELESS TELEGRAPHY.

It is only about two years ago that the magazine-reading world was astonished to peruse an account of the first practical efforts which Marconi had made in connection with the project of sending telegraphic messages through space, without the use of wires. The idea took most people by surprise, and the article itself, which was from the pen of Marconi, did not speak too enthusiastically of the probabilities of the near future. Messages had been sent by him short distances through stone walls, water, and a small mountain, and the discoverer of the marvellous possibilities recorded then expressed the opinion that time might enable those who were able to undertake the research necessary to find them, methods by which the then discovery would become of practical value to the world at large.

It was a fortunate thing that Marconi was a man of comparatively independent means, thus being himself able to undertake and conduct a series of experiments which have continued uninterruptedly to the present time. In these experiments he has been associated with some of the leading electricians of Europe and the result has been that telegraphic messages have been despatched and received a distance of upwards of twenty-seven miles, without the use of any wire, an achievement which indicates that there is apparently no limit to the development of the new telegraphy, which promises to make a complete revolution, in the course of time, in the telegraph systems of the whole world. When such developments have been reached within a couple of years it is reasonable to assume that the difficulties still in the way of the universal adoption of the Marconi system.

The development now struggling into practical use is distinctly a modern marved, and it, in reality, dates only eleven years back, with the discovery by Professor Hertz of how to create electric waves. He died before any of the fruit of his labor was reaped. He took out no patent, left no vested interests; simply laid the world under a debt it will not be asked to pay. Before the Hertzian wave was made known, in 1888, experiments in telegraphing without continuous wires had been frequent, and more or less successful. The methods were by conduction in which earth or water act as part of the circuit, and by magnetic induction. By the first method rivers had been spanned, communication opened with some

lighthouses from the mainland, and in 1882 messages were successfully sent without cable across the Solent. But a considerable base line carrying wires is required at either end. Induction, by which signals are obtained without the agency of either earth or water, is another method capable of utilization over a limited range; and, indeed, is so utilized already.

But it is upon the pioneer work of Hertz that the present developments of wireless telegraphy are founded. To him belongs the credit of the wave-emitter; to a Frenchman named Branly (who has also missed his reward) the credit of devising the best means by which the waves may be detected. Professors Righi and Lodge and Signor Marconi, who have been tireless in elaborating these "detectors," are alike under obligation to Branly for the discovery that fine metallic powder changes its properties when exposed to an electric wave and becomes an excellent conductor. Guided by this discovery, the ingenious Signor Marconi set his wits to work, and has finally emerged from his laboratory equipped with a little glass tube about an inch in length with which he works his wonders. An insignificant-looking appliance truly to compass such great results. It contains two silver pole pieces, and in the tiny space between—exhausted to a high vacuum—a pinch of metal filings. What it can accomplish, however, is thus described:

"In this normal condition the metallic powder is an insulator; it allows no current to pass through it. But let an electric impulse fall upon it; its condition changes, order is impressed upon its disordered ranks, it is polarized or oriented or marshalled in serried array. It becomes a conductor; it coheres, and allows a current to pass. This will continue until it is tapped or mechanically shaken, when it instantly returns to its previous irregular and insulating state. It is, in fact, decohered. Mr. Marconi decohores by making the current itself vibrate a small hammer against the glass tube, which in striking emits a sound. Such sounds can be formed rythmically into a telegraphic language, or the current so set up can actuate a Morse or Kelvin recorder, and print the messages sent in dot-and-dash letters."

Such is the latest plaything from the electrician's laboratory. Signor Marconi is, in fact, not the expounder of a new principle, but the inventor of the most ingenious and sensitive contrivance yet produced for picking up the Hertz waves at a distance. From the foregoing details it will be seen that the

one of the obstacles now to be overcome is that of resisting the spread of the electric waves which are emitted, or in other words, concentrating them to one particular point. As the matter stands at present anyone with a detector apparatus could take off the messages sent forth from the emitter, thus destroying the merit of secrecy which is essential in connection with telegraphic communication, while confusion would certainly ensue if it were possible for thousands of people to utilize the system in all directions, as the detectors would be taking off all the messages within a considerable circuit, and thus rendering confusion worse confounded. That these drawbacks are capable of being remedied there can be no doubt, for the intelligence which has achieved so much as has been done will not stop short of accomplishing whatever may be requisite to give the system a practical value.

How far the distance over which messages may be sent without wires may be extended it is impossible to determine, but since we have increased the distance from two to six miles there would appear to be no reason why that distance should not again be further extended. That within the next decade we shall realize many wonderful developments in connection with telegraphy no one can question, and it is certain that nothing will tend more to the advancement of progress and civilization than the universal communication by telegraph between one part of the world and another which the new system opens up to our view, and upon these grounds the recent discoveries of Marconi and those associated with him must be regarded as among the most important that the world has ever known.

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HAWAIIAN SUGAR INDUSTRY.

In a series of articles contributed to *Harper's Weekly*, by Caspar Whitney, consideration is given to the commercial development of Hawaiian-America. He states that the considerable development of sugar interests in Hawaii was simultaneous with the beginning of an effort, long continued, for closer trade relations with the Mainland, as we must call the United States. So long ago as 1853 it had become apparent that Hawaii, as, in fact, an outlying sugar plantation of the United States, was entitled to recognition as such on the tariff list.

This came with the enactment of the reciprocity treaty of

1875, which an English trader truthfully declared a few years later to be the "biggest little thing in existence." Mr. Whitney states that with the signing of this reciprocity treaty the Hawaiian industrial and commercial status underwent complete revolution.

"The significance of reciprocity to the prosperity of the islands became immediately apparent. Industrial activity was instant and general; thirteen new sugar plantations were laid out in 1877, fifteen more in the year following; mills were erected, shipping increased, and a general air of hopefulness and confidence spread over Hawaii.

"The large sugar returns very naturally prompted further expansion, and in 1888 and 1889, responding to the ruling spirit, some of the most extensive plantations on the islands were laid out.

"Sugar is practically Hawaii's commerce, and Hawaii's commerce is substantially sugar. Of the 1897 export figures of $16,021,775, sugar represented $15,390,442 (and of this total $15,390,223 came to the United States). Incidentally let me note that of the thirty millions of dollars invested in Hawaiian sugar plantations, twenty-two and one-half millions is American; of the total population of the islands (109,020), nearly one-quarter (24,653) are employed on the sugar plantations; of the Chinese and Japanese inhabitants (45,000), almost half (21,000) are employed on the sugar plantations. With this array of figures confronting him, the inquiring reader will hardly challenge my statement of sugar's relation to Hawaiian commerce.

"Sugar-cane is one of the comparatively few indigenous products of the Hawaiian Islands—for, strange to relate, with the exception of a few varieties, all the trees, flowers, and fruits that nourish on the islands were planted by the early white settlers; not even the banana is indigenous; and the present cocoa-palms that picturesquely fringe the Honolulu harbor were all planted—every last one of them. However, as sugar-cane is mentioned by Captain Cook in 1778—before there were any whites on the islands—we may accept it as having been native to the soil. We know there are abundant statements from old natives that it grew wild and luxuriantly in the valleys and on the lowlands, but the natives made no use of it except as food in its raw state.

"The first real impetus to cane-growing came with the outbreaking of the Civil War and the inflation of sugar values;

the second was given by the reciprocity treaty with the United States in 1876, and the third has been furnished within the present years by irrigation.

"How these eras have affected the output is best told by the figures: in 1863 about 2,600 tons were exported; in 1876, upwards of 13,000 tons; and in 1896, 240,000; and it is not at all unlikely that this year the figures will reach 260,000 tons. It is interesting to note further, while we are on comparative figures, that the exports of sugar compared with the labor employed in its cultivation and manufacture during the last three years show the following gradual increase: '1895, nearly 7⅓ tons per capita employed; 1896, a little over 9⅓ tons; and in 1897, very nearly 10½ tons.'

"There are sixty plantations on the islands, of which fifty own their own mills and have all needed machinery for the manufacture of sugar. Practically all of these use the crushing process—which the most experienced planters on the islands prefer. The diffusion process was introduced to Hawaii about 1887, the first plant being erected at Kealia (Kauai), others following, until there were half a dozen; but the improvement in the crushing process has arrested the attention diffusion methods were diverting. The diffusion process saves within 5 per cent. of the sugar in the cane, whereas the mills lose from 10 to 18 per cent. On the other hand, the diffusion plant necessitates the extra cost of fuel, whereas in the mill the cane pulp—or bagasse, as the cane is called when the juice has been crushed from it—supplies all the fuel necessary. Moreover, the constant increase in number of rollers in the mills is steadily lowering the percentage of sugar lost in the crushing process, and experts are confident that before improvement ceases the average extraction in the mills will very nearly equal that by the diffusion plant. As it is, there are very few diffusion plants, and planters claim that the cost of manufacture is less and the general results more satisfactory by the crushing process.

"Nowhere is there equal cultivation of the soil or such care of the cane as we see in Hawaii. Laboratories in many instances are connected with the mills; the soil is analyzed before the planting, and fertilized according to its need; steam-ploughs are used where the confirmation of the land will permit it; the mills are the best money can buy, and as competition in the manufacture of machinery is sharp, almost every year adds some new and scientific improvement. I may

add, by the way, that the McKinley bill repealing the duty on sugar was somewhat of a blessing in disguise to these islands, although it was at the time a heavy blow (the price of sugar falling from $100 to $60 per ton in one day), as under the treaty Hawaiian sugar entered the United States duty free. But meeting the prices and output of other sugar-producing countries necessitated abandonment of the simpler methods that were profitable enough with high prices and no competition, and the movement began which resulted in Hawaii having the finest machinery in existence—and all American made. Last year the nine-roller Ewa mill on Oahu turned out 140 tons of sugar each running day.

"The soil of the valleys is very rich indeed, and invariably planted in rice; the sugar lands are those along the coast of the islands, extending back to an elevation of about fifteen hundred feet; beyond that is coffee land or pasture. And wherever there is land fit for growing sugar, there will be found cane, either present or immediately prospective. There is practically now no land on the Hawaiian Islands capable of raising cane profitably that is not so employed.

"Improved machinery and fertilizing have tremendously increased the annual sugar yield, but the real developer of Hawaiian plantations in recent years has been irrigation, which has reclaimed for cane much land previously considered irredeemable.

"The average yield of sugar to the acre of cane is greater in the Hawaiian Islands than in any other country in the world. It varies, however, a great deal; the average yield of Maui, for instance, is about three and one-half tons of sugar to the acre; Hawaii's average is lowered by the smaller producing qualities of her leeward or dry side, but would not go lower than four tons; Kauai, from four to five tons; and Oahu, six to seven tons. There are, of course, pieces of ground, even entire plantations, on these islands, where the yield would greatly exceed the average of the island; one plantation of Oahu, for instance, yields ten tons of sugar to the acre (it takes seven to eight tons of cane to produce a ton of sugar), and special yields of even sixteen tons per acre have been obtained from given sections of the same Oahu plantation. The quality of these figures is the better appreciated by comparison with the yields of Louisiana and Cuba.

"The average yield of Louisiana—according to the figures of Professor W. C. Stubbs, Director of the State Experiment

Station, has been kind enough to furnish me—varies from one ton to two and one-half tons of sugar per acre, the average being perhaps not over one and one-half tons.

"Cuba's cane-raising possibilities have never been fully developed. The yield per acre prior to the war was very light, because of the general agricultural deficiency of the island, due to Spanish corruption, Cuban lack of enterprise, and the troublous times. Certainly not to any deficiency in the soil, as the fact that they carry the cane to the sixth and even to the twelfth ratooning indicates. Ratooning means cutting the cane at the ground's edge and leaving the root to sprout the next year—so a sixth ratooning would mean that the one planting had yielded six crops of cane.

"In Louisiana cane is planted once in two or three years—rarely is it permitted to remain longer than three years. In Hawaii cane is planted every second year, as a rule, and rarely goes beyond the single ratooning. Of course, ratoon cane is not so rich, but frequent planting adds tremendously to the expense and necessitates heavy fertilization—however, the increase of yield seems to warrant the outlay, if we may judge from Hawaiian results.

"Cuba has some modern plantations and some excellent mills; the cane grown on the island is fairly rich in sucrose, and if it had the same cultivation given cane in Louisiana or in the Hawaiian Islands, yields would be forth-coming, Professor Stubbs estimates, probably as high as five to six tons of sugar to the acre. As it is now, the average Cuban yield is rarely over one to two tons per acre.

"According to some sugar-refining experts with whom I have talked on the subject of Hawaiian, Louisianan, and West-Indian sugars—and who have but recently completed a series of extensive experiments—the Hawaiian soil is peculiarly suited to cane-growing, and will continue to yield sugar more heavily per acre than that of Cuba, no matter how scientific the cultivation of soil or how complete the machinery for extracting the juice. By the same token the Hawaiian sugar is considered just as much superior to the Cuban as is its soil. Therefore the possibility of sugar-growing becoming unprofitable, and the consequent decadence of the industry in Hawaii, need not concern us. Though the day is sure to come when the profits of Hawaiian planters will be materially lessened. They could easily be cut in half and the planters still have handsome returns on the capital invested. However, it will

prove a costly mistake if investors feel they cannot lose money in any Hawaiian sugar stock that may be put on the market. It is not unlikely plantations may be floated whose stock will hardly yield satisfactory returns. Hawaii is perhaps destined to undergo one of those characteristically American booms, with an accompanying reaction which will settle hard upon wild plantation schemes that have been launched upon the strength of those already legitimately established. It will be for Hawaii's best interest if the islands escape one of those Western booms that fill towns with hungry mechanics and unscrupulous promoters."

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THE SUGAR INDUSTRY OF PORTO RICO.

With a view to adding to the general information concerning the sugar industry, I made a trip to Porto Rico and Cuba in the latter part of the year of 1898, remaining until early spring of 1899. I investigated as closely as possible the cost of producing and transporting sugar and other conditions of the sugar industry in those islands, and especially in Porto Rico.

General Information.—The island of Porto Rico is very nearly a rectangle, allowing the outer margins to be broken by a few small capes and bays. Its greatest extent is east and west. In round numbers it is about 90 miles long and about 40 miles wide. It has on all sides a level, low coast plain, varying from 3 to 10 miles in width. This lowland is composed of cultivated lands and marshes. Through the center of the island extends a chain of mountains which ranges in altitude from highlands to an elevation of 7,000 feet at its highest point. Among these mountains are numerous passes and valleys, and, radiating from them in every direction, streams of fresh water flow into the ocean. The streams vary in size from small creeks to large rivers.

The soil of the valleys and the belt around the border is largely made up of a silt formation and the disintegrated rocks of mountains washed to these lower levels. The island itself is of a calcareous rock, coral formation, and volcanic upheaval. The island is very fertile and productive, and will grow almost anything that can be grown in the tropical or semi-tropical regions, and some things belonging to the temperate zone.

The principal exports are coffee, sugar and tobacco; in fact,

these are about all the exports worth mentioning. In addition to these the island carries on a small trade with adjacent islands in hides and cattle. Besides this, it produces readily cocoanuts, oranges and several other fruits peculiar to the Tropics. The cocoa bean is grown to an extent sufficient to indicate that it would do well. Vanilla is also produced in a small way.

Over one-half of the inhabitants of Porto Rico live on 5 cents a day or less, estimated in American money; and in this class are to be found the people who perform the daily toil of the island. Indeed there are many who live from one week's end to another on so simple an article as sugar cane, and this cane is sold in the markets for that very purpose. Cocoanuts can be bought at 1 cent apiece, which are very nutritious and palatable, but hardly desirable to use largely as a ration for workmen.

Sugar cane is raised under irrigation, as well as tobacco and other products, but the opportunities for the investment of capital might be very much increased by the development of irrigation in this area.

Sugar cane requires a great deal of moisture, and it seems to do best where the ground has been soaked thoroughly, especially when the water is warm in the soil. The region drained by this river may be called the principal sugar section. It comprises the districts of Carolina and Canovanas. Twelve per cent of the sugar made on this island is made here. Another principal river flows south, called Rio Guamani. It flows through the country in which irrigation is practiced.

The principal sugar districts are in the coast belt and valley of the north side and west end of the island.

It will be noticed that the exports of sugar for these two years were as follows: For 1896, 58,000 tons, valued at $2,240,734 in United States money! for 1897, 60,000 tons, valued at $2,448,800. It is estimated by those most familiar with the resources of Porto Rico, and on this point the agreement is general that the exportation of sugar could be increased 100 per cent., that is to say, doubled. This would result from the introduction of modern methods and modern machinery, along with drainage and other means of extending the cultivation of sugar cane to lands not now devoted to that purpose.

The sugar now exported from Porto Rico is about equal to 3 per cent. of our importations, and if the industry in this

island were increased to its fullest extent, then Porto Rico would be able to furnish 6 per cent. of our importations.

Sugar Factories.—The methods of manufacturing sugar now in use in Porto Rico are very primitive, as a rule. There are a few that might be classed as up-to-date factories, but not many. There are only six factories on the island, for instance, that have a double crusher system of getting out the sap, and the number of factories that have the triple vacuum effect is limited. The methods in vogue range from the modern down to those which are obsolete, in which oxen driven to a sweep are used in pressing the juice out of the cane by means of iron and wooden rollers, and a large per cent of the factories have the open-pan evaporation.

I was able to find, in all the factories I examined, only one that supported a chemical laboratory and kept any record of data regarding the quality of the cane or the effectiveness of the processess employed. Except in this case, the factory people appeared to have no idea as to the amount of the sugar they were getting out of the cane, or the amount of sugar that remained in the molasses. Under such conditions, there was nothing to stimulate improvement if they should attempt to make any.

The best work on the island secures a product equal to about 10 per cent. of the original weight of the cane. Such results are confined to a few factories. A larger number are securing perhaps 8 to 9 per cent., and a still larger number less than this. The exact results no one will ever know, because those interested themselves do not know.

There are two periods for planting cane in Porto Rico—spring and fall. The spring planting runs from February to May, and the fall planting from August to December. The spring planting can be cut in from twelve to fifteen months, but is usually allowed to stand fifteen months, and the fall planting stands fifteen months as a rule. I found that the number of crops cut from one planting ranges from one to eleven, that being the highest reported. In a majority of cases the number of cuttings from one planting is three or four.

Cultivation.—The system of preparing the ground and cultivating sugar cane in Porto Rico is as follows: The land is first plowed about 9 inches deep. It is then cross plowed twice; sometimes it is harrowed. Then between every second row and running with the rows a ditch is dug with a spade

about 1 foot deep and 1 foot wide, the dirt being thrown up on the center of the ridge left between this and the next ditch, which ridge is wide enough for two rows of cane. Main drains are run around the side of the field and cross drains occur every 2 or 3 rods. Of course these cross and main drains are considerably larger than the regular cultivation drains. The rows are about 7 hands apart, and the hills in the rows are about 6 hands apart.

The cultivation consists simply in hoeing about three times, which is sufficient to keep the weeds down until the cane is large enough to be out of danger from them. In about nine months the main part of the leaves is stripped off from the cane, and about a month before harvesting this is done again with a view to allowing the sun and air to do their part in the formation of the sugar. The operation is called "trashing."

Yield of Sugar Cane.—According to the best information gleaned from the best cane growers, the first crop on the best land yields from 35 to 45 tons per acre on an average. On the best cane ground the first crop with the three rattoons would produce an average of from 15 to 20 tons.

Mr. Marr, of Canovanas, says that the first crop on good ground should be 40 tons per acre, with rattoons ranging from 20 to 25 tons, but he says there is much land that is tired out, from which may be expected such yields as the following: First crop from 20 to 22 tons; first rattoons from 15 to 17 tons; second rattoons from 10 to 12 tons. The average of the rattoons is about 16 tons per cutting. Mr. Finlay makes the following estimate: Good ground, first crop 40 to 45, first rattoon 20 to 25, second rattoon 20 to 25 tons per acre; second class ground, first crop 40 tons, and rattoons, considered inferior, ranging from 12 to 15 tons. The same gentleman also says that the best varieties are Salangore and Olaheiti.

There are no by-products to speak of incident to the manufacture of sugar from cane. Nearly all the factories of the island work up their waste molasses into rum. It takes about 2½ gallons of molasses to make a gallon of rum, according to statement of Mr. Marr. Factories are able to sell this rum for about 38c. a gallon, according to the statement of Mr. Finlay. If a factory does not make rum, it sells its molasses to some factory that does for about 5c. a gallon. This rum has a local market as a native drink; it is also used in the manufacture of bay rum of certain quality, and in compounding other drinks, like poor gin and whisky. The "megass," or re-

fuse of the cane stalks after the juice has been squeezed out, might be called a by-product, because it is used for fuel. The fuel used in these factories is composed almost entirely of this megass, very little wood or coal being used; in a great many factories the megass is entirely sufficient. In some cases it has to be dried in the sun, which makes it more expensive.

ROTATION OF CROPS.—At the present time Porto Rico has been growing cane on the same land year after year for a century or more. Another one of the great needs of the island is a system of rotation of crops. The land is productive, the climate seems right for producing a great many things that would be profitable, and it is certain that experimentation would show that many plants could be added to the very short list of those cultivated at present, so that rotation of crops would be entirely feasible. At the present time they are especially in need of forage plants.

CENTRAL FACTORIES.—One of the greatest needs of the island in connection with the sugar industry is a system of central sugar factories. At present, if a man has a body of ground that happens to be good sugar cane ground, in order that he may realize from the productiveness of it, he makes a sort of sugar plant, be it ever so small, inefficient, or obsolete in its methods and machinery. A system should be devised that will appeal to all these small producers in a business way. That it will be more profitable and better in every way to have one large central factory, with modern machinery and methods, where the sugar can be produced more cheaply and of a higher grade, ought to be apparent to all concerned. This can be accomplished by co-operation, or by the system used by Mr. Marr of buying the cane and paying for it in sugar. The principal advantage of such a system lies in the economies which naturally result from manufacturing, handling and selling the product in large quantities.—Report of G. S. Dyer, in U. S. Bulletin.

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Bradstreet's reports the failures in June the smallest number for seventeen years, which is pretty good evidence that trusts and other bug-a-boos of the commercial world are not working damage to the individual trader. Further testimony to the decline of business troubles to a minimum is found in the small percentage of assets to liabilities. Money is firmer, the July dividends amounting to between $120,000,000 and $150,000,000.

TRINIDAD BOTANIC GARDEN REPORT.

The report on the Royal Botanic Gardens of Trinidad for the year 1898 is a most interesting document showing the large amount of work done by the Superintendent, Mr. J. H. Hart, and his assistants.

Economic plants receive much attention, and there is a large demand for these in the Colony and from abroad—plants and seeds being distributed to correspondents in all parts of the world, including Africa, Fiji, Java, Queensland, Mauritius, etc.

Experimental cultivation of cane seedlings is evidently carried on with much skill and care. The result of the 1898 operations could not however be ascertained, until the close of crop in April 1899; and the report deals therefore with experiments in canes planted in April 1897 and reaped in April 1898. Some of the Demerara canes had a high sugar value, but a cane raised from Demerara seed grown in Trinidad gave the highest return, the percentage of sucrose being 21.3.

Mr. Hart says:—"Seedling canes have a period of ripening differing with each kind. Some require twelve months to ripen, some fifteen months, while not a few are ready for the mill in nine or ten months if good weather. The Bourbon as usually planted take some fifteen months." And it is urged that a cane coming to maturity regularly in ten or twelve months, or ripening even in nine months, would be a boon to the planter. Of course in such a case labor would be wasted during the months previous to taking off crop, if there were no planting to do, but where growing and manufacturing are separated, it would be to the advantage of the farmers to get their crops matured as quickly as possible.

Mr. Hart notes that there is a preference for yellow over dark or colored canes, and he invites growers to furnish a reason for this. The best Trinidad cane is a colored cane raised from Barbados seed.

Seeding canes appear to exceed the standard varieties in richness, an average return of available sucrose of 18.6% being obtained from 20 varieties of seeding as against 14.7% from standard kinds.

A Nicaraguan cacao tree *Theobroma pantogona* or alligator cacao has fruited for the first time in Trinidad. It yields cacao of high value for manufacturing chocolate and cacao powders. It is singularly free from blight or failure of the

young pods. Much advantage has been derived from grafting cacoa by approach, or, better still, inarching. Uniformity in the cacoa grown is one result and it would easily be possible to have an estate planted with none but cacao of the highest possible excellence.

Cacao pods are liable to a disease which although in existence for several years has become more noticeable of late. In 1898 considerable loss occurred on several estates from this cause. The pods become covered with the spores of a parasitic fungus which attacks healthy pods in the vicinity of those affected even without actual contact. This disease is without doubt caused by allowing the pods from which the beans are extracted to lie and rot upon the ground. The destruction of all diseased pods and the removal and burial of all empty ones, and dressing affected trees with blue vitriol solution, are recommended as preventatives and cure.

In pods which become blackened, the beans are found to have deteriorated, becoming thin, light and of poor quality.

Much energy has been shown in cultivating rubber plants, chiefly *Castilloa elastica*, which does better under shade than when unprotected; and being hardy and of rapid growth, is better suited to the climate of Trinidad, than are other kinds.

Hevea Brasiliensis or Para Rubber is of superior quality and although of slower growth than Castilloa, it has many advantages over it.

Kicksia Africana or Ire Rubber has been newly introduced from Africa and appears to be well suited for growth in Trinidad. Ceara and other kinds are not much esteemed.

Several varieties of coffee are mentioned in the report, some of them well deserving attention. The culture of coffee is slowly extending in Trinidad, and as plants are sold at the low rate of 4 a penny it should become more general.

Orange culture has been attended with success. Plants imported from Florida have done well, some of them bearing very fine fruit. The oranges hitherto grown in Trinidad are of the St. Michael's type, with those of the Mandarin and Tangerine description, probably brought to the Colony by Portuguese immigrants. A really sour orange, except the bitter or Seville kind, is extremely rare. Compared with Trinidad, Guiana is very backward in the cultivation of fruit.

The Report speaks of several diseases to which orange trees are liable. In one case fungus attacks the root causing the tree to die in a few months. This occurs most frequently on

well drained land. There seems to be no remedy for this disease, the first sign of which is the dropping of the leaves, when it is too late to attempt remedial measures.

The common 'blight' on lime trees (Coccid Chionaspis Citri) yields to treatment by abundant application of fresh stable manure. Insect pests, although killed out with insecticides, reappear with renewed vigor. Exhaustion of the soil or absence of any constituent necessary for the growth of the tree invites the attack of scale and other insects, as is also the case where there is a superabundance of growth.

It is pointed out that there is one advantage in growing oranges which vary in the period of ripening, since increased profits can be made when the fruit is on the market before that sent from other countries.

The old ashen shafts used for lances in the British army have long been superseded by bamboos obtained from India. A large number of specimens grown in the Trinidad Gardens are being prepared for examination by experts. The industry promises to be profitable, as the staves are worth 3 shillings each, which leaves a good margin.

Experiments have been made to ascertain the food value of Guinea grass, (panicum maximum), of which the crop of a cutting weighed at the rate of 13.4 tons per acre. It was ascertained that after separation of waste portions there remained 8.98 tons of undried fodder to the acre.

Six crops were obtained in the year and the total weight reaped amounted to 75 tons per acre, yielding after deduction of unedible portions 18.60 tons of air-dry grass from one acre in a year. The land on which this grass was grown was not manured. In some of the West Indian Islands, the only treatment which Guinea grass gets is the burning of the dry stools; in a few days the black ground becomes vivid green from the young sprouts.

Guinea grass is richer in albuminous compounds than Clover, Vetch, Bahama or Para grass; the latter, which is abundant in Guiana, yields only 5.24 of such compounds against 7.80 contained in Guinea grass, which is the most economical of all grasses for feeding horses and cattle.

The Trinidad Gardens appear to be of great value in the introduction and cultivation of economic plants.

Seeds and plants are obtainable at reasonable prices. The authorities preferring to sell plants, rather than seeds, which in less skilful hands are liable to be wasted.—Dem. Argosy.

AGRICULTURAL EXPLORATIONS IN JAPAN, CHINA AND THE PHILIPPINES.

Dr. S. A. Knapp, who was sent by the U. S. Department of Agriculture to Japan, China and the Philippines, as an agricultural explorer, has reported to Secretary Wilson the results of his explorations.

He was instructed to investigate such products of the farms, fields and forests of those countries as might be of advantage to the agricultural industries of the United States, noting especially any superiority in the equality of the products or in their economic production and agricultural conditions, including cost of labor.

He was particularly instructed to secure a quantity of seed rice of high flavor and nutritive value, which should furnish a much larger per cent of head rice (whole grains) in milling than the ordinary seed now used in the United States, and to purchase sample lots of any seeds, plants or trees which he might consider of especial economic value to our people. He was further instructed to ascertain what demand there is, or might be, for American butter and cheese in Japan and China, and, if necessary, to secure agents to handle sample consignments.

Dr. Knapp reports that he arrived in Yokohama, Japan, September 27, 1898, and at once entered upon an investigation of the rice industry. In most of the large cities of Japan there are good agricultural museums where samples can be seen. The one in Tokyo is of exceptional merit. Two days at the Imperial College of Agriculture, where many experiments in production of rice have been conducted, and one day at the Agricultural Museum, of Tokyo, gave him a list of the best rices of Japan from the scientific standpoint, and from the practical, so far as indicated by samples. The second step was to visit the fields and examine the standing rice, noting varieties and methods of cultivation; after which the millers were seen as to the best varieties for milling, and finally such experienced exporters of rice in the treaty ports as were the most reliable were consulted. By consensus of opinion it was agreed that Kyushu rice was superior to that produced in any other portion of Japan, in purity of the seed, in nutritive value, in flavor, and in milling quantities. Samples were obtained from Kyushu and the best selection made. Ten tons of Kyushu seed rice were purchased and samples tested by

milling before shipment to the Department of Agriculture for distribution. If this seed under American conditions of production shall transmit all its excellent qualities it will ultimately benefit our producers nearly two millions of dollars annuallly, which amount is now lost by breakage in milling.

Among the valuable plants considered worthy of introduction, he selected hagi (*Lespedeza bicolor*), a new Japanese forage plant of great promise. It is claimed by the Imperial Agricultural College that under three years' test hagi has shown great vigor and adaption to diverse conditions of soil and drouth; that it is more easily set in land than alfalfa, more tenacious when established and furnishes an equal number of cuttings of high nutritive value. When seen in the college experiment grounds the stalk was large and woody, but the professor in charge stated that it was tender if cut frequently.

A number of other trees were purchased, all of which had already been introduced into the United States, but which are so universally important in Japan that a new importation is advisable. The varieties secured have been selected with special reference to their adaptability to particular sections of the United States. Among these are a variety of camphor, which becomes a large and beautiful shade tree, stands considerable frost, and furnishes a good quality of commercial camphor. Another of these trees, *Cryptomeria japonica*, is a beautiful evergreen, which reaches an enormous size under forest conditions, but thrives also when dwarfed. It is used extensively in Japan for foresting mountain tracts. The wood, though somewhat soft, takes an excellent finish. The bamboo which has been secured has more economic uses than any other plant in Japan. It provides material for the house, fences, furniture and household utensils of the common people. It should become a general product in the southern part of this country.

In addition to the foregoing trees and plants a few approved varieties of the Japanese pear, persimmon, plum and the giant biwa were selected to test their value for general use in the United States.

The perfection attained by Japanese fruits and seeds is due to very thorough cultivation and fertilizing. Their entire system of agriculture is slow, laborious and painstaking, but the results are marvelous in quality and quantity of product. Fertilizing the soil is laborious and expensive. There are

practically no domestic animals in a large portion of the Empire. Human excreta is the chief fertilizer. This is carefully preserved in cities and villages, transported upon men's shoulders or in boats to the fields and, in a diluted form, used to water the plants. Green manures, grass, straw and fish are considerably used. Rice straw is, however, too valuable to be thus employed. It is used for rice and coal sacks, for mats and rope for manufacture of paper, and in numberless economic ways.

The limited amount of arable land in Japan, only about one-eighth of the entire area of the Empire, makes it necessary to conserve and stimulate all of the productive energies of the soil available for cultivation. Hence the field crops are all managed upon garden methods. The seed for all the wheat, rice, rye and barley produced is first sown in highly fertilized beds and when the plant is of sufficient size it is transplanted into the fields, much like cabbages.

When it is considered that there are three persons in Jappan for every acre susceptible of cultivation it is plain that the home market is sufficient for all the home products of the Empire. The population of Japan (exclusive of Formosa) in 1896 was officially given as 42,708,264 and the area cultivated in food products as 13,064,568 acres. All fear of competition from Japan along agricultural lines may be dismissed. On the contrary, it must become a large consumer of farm products drawn from the United States. The diffusion of knowledge and the introduction of new industries in Japan have had the effect of more than doubling the cost of labor in the last ten years and, in proportion, of stimulating consumption by the common people. Future progress must be mainly made in the direction of manufactures. In such event the food for the operatives, the cotton and other fiber material for the fabrics, the lumber and iron for the construction of the factories and much of the machinery will be drawn from the United States. This will tend to stimulate the prices of our farm products. The same general facts hold good for China. The opening of the Orient to commerce will act must beneficently upon our agricultural industries.

Industries that involve considerable labor in proportion to the amount of land required are well suited to the industrial conditions in Japan. Tea, silk and matting are examples. The number of families engaged in the production of tea was, in 1896, 762,634. The manufacture of silk employed 660,-

409 families. Weaving is mostly done in the homes by women. Of the total number of operatives 1,042,866 employed in 1895 in the manufacture of silk, 985,016 were women. The matting industry gives employment to 103,044 families. It is difficult to conceive how the factory system of the United States could be substituted generally for the home system prevailing in Japan without a social revolution. If successful, it must be exceedingly gradual.

The principal agricultural products imported into Japan are wheat, flour, sugar, cotton, butter, cheese and meat. The annual value of these articles is at present between $54,000,000 and $25,000,000 in gold. Under favorable treaty regulations Japan will imports from the United States nearly all her flour, butter, cheese and meat, three-fourths of the raw cotton required and from the Philippines nearly their entire surplus output of sugar.

The butter and cheese market will be of comparatively slow growth in Japan, but will steadily improve if properly fostered. The matters of most vital importance to the butter trade are the following: First, shipment of first quality butter for table use; second, small air-tight packages with official stamp on same, denoting inspection and certifying to grade; third, cold storage on ocean transportation at reasonable rates for small qualities; fourth, the establishment of cold storage in the leading cities of the Empire. Cheese rests upon a different basis and can largely be left to the ordinary course of trade. The conditions of the butter and cheese trade in Shanghai and Hong Kong, China, are almost identical with those of Japan, except at Hong Kong Australian butter is a strong competitor by reason of low freight rates. In the interior of China considerable French butter is sold. Many claim that it resists heat better than the American product. The same general suggestions for the improvement of trade in Japan are applicable to China.

From China he proceeded to the Philippines, and there took up the same line of investigations pursued in Japan. On arrival at Manila he found it somewhat dangerous to go into the country but concluded to go by rail as far as San Fernando, passing through the rice section to the east and north of Manila, on to the sugar lands to the north. He observed that but a small portion of the rice lands was irrigated; that the fields were small and the system of planting and harvesting similar to that of Japan. The water buffalo is universally

used for plowing and drawing loads. Depending mainly upon the rainfall for irrigating the rice, planting is not done till the commencement of the rainy season.

The rich clay-loam soil about San Fernando is well adapted to sugar cane. In the island of Luzon the methods of sugar farming are quite different from those practiced in the United States. The cane is not allowed to ratoon but is planted annually. At the time of cutting the cane for the mill the immature portion of the stock is planted in a field previously prepared. Very little cultivation is done. The cane matures in twelve months from planting and is harvested before the rainy season commences in May. The sugar factories in Luzon are the crudest conceivable. The mills are not better than farm sorghum mills. The kettles are simply wooden tubs with cast-iron bottoms. The sugar is drained upon the open kettle plan. The proprietor furnishes land and factory and the tenant furnishes seed, does all the work in the field, delivers the cane to the mill and supplies most of the hands for making the sugar. The proprietor receives one-half the sugar and all the molasses. The tenant, in theory, is allowed the remainder, but in practice he usually receives about two-fifths of the sugar. Dr. Knapp was informed that in the islands of Panay, Negros and Cebu the sugar farms and factories are much more improved than in Luzon. Sugar lands produce from 3,000 to 8,000 lbs. per acre, depending upon the cultivation and the factory.

The Filipinos, as far as he observed, do not give as much attention to the production of nitrogenous foods as the Japanese, and hence are less muscular. He was unable to visit the tobacco section in North Luzon and the hemp district of South Luzon. Spanish statistical reports and his interviews with exporters at Manila satisfied him of the prosperity of these industries under normal conditions. Millet, maize, sago and indigo do well and are ordinary profitable crops. Philippine coffee, of which there were formerly many plantations, has a peculiarly rich and pleasant flavor. Evidence was presented to him showing that the industry can be made profitable. Cocoanuts, pineapples, oranges, bananas, grapes, figs and many other fruits grow almost spontaneously; with reasonable care they would become articles of export.

The Philippine Islands abound in valuable woods for building, furniture, dye woods, and some yielding costly gums.

While unable to visit the forests Dr. Knapp saw many remarkable specimens cut from the giant tree, among which was a section of a mahogany tree from Mindanao, over seven feet in diameter. Consul Williams shipped this to his home, in New York.

According to the best authority nearly two-thirds of the lands is still public and passes to the United States with the title. If opened for settlement to soldiers many of our young men will remain and become permanent settlers. Some associations of this kind have already been organized. The price of improved land ranges from $4 to $20 per acre, gold, depending upon the location and value of the improvements. Dr. Knapp spent several days in a real estate office examining plats of plantations and discussing improvements and prices with proprietors of estates from a number of the islands. A sugar plantation of 2,500 acres in the extreme southern portion of Luzon was offered at $20 per acre. It was well situated; all arable land; good buildings; sugar house, modern, with vacuum pan; 800 buffaloes and 1,200 people on the place The proprietor claimed to have received an annual net income of $16,000 (gold) from the property. He was a Spaniard and wanted to leave the country.

The temperature is quite uniform, averaging during the past eighteen years 77° for January, the coldest month, and 83.8° for May, the warmest month. Within that period the thermometer only rose 100°, and once fell to 70.4°.

Prominent Filipinos assured Dr. Knapp that upon their estates the laborers were industrious and thrifty, and if encouraged these conditions would become general. A visit to the carpenter shops, machine shops and various small factories satisfied him that the Filipinos make good mechanics when properly trained.—*U. S. Department of Agriculture.*

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A REVOLUTION IN GRAFTING.

Secretary Lelong of the State Board of Horticulture has announced an important discovery which, if it comes up to expectations, will be worth a large amount of money to California horticulturists. For many months past Secretary Lelong has been endeavoring to grow cuttings from different species of trees, by grafting them on a foster mother root. It is said that success has crowned his efforts, and he now first

gives the result of his work to the horticultural world. His discovery means, in a nutshell, that you can take the limb of any kind of a tree, put a foster mother root to it, and in a very short time the limb will take root and become a tree.

A dispatch from Sacramento says:

"Limbs two feet long were taken from Washington navel orange trees and united with foster mother roots and placed in a sandy soil, and in two months they had attained a growth equal to two or three years by the ordinary methods. The same results were obtained with the olive, apple, peach and pear, together with other varieties of trees. As a result of this discovery, Secretary Lelong says that our horticulturists will not have to wait five years for orange trees to bear, as they can be advanced to the bearing stage in one year from the first operation. With olives the bearing time can be reduced from four years to one year, and the same is true of apples, peaches and pears. This will make an enormous difference financially to fruit growers.

"The same line of experiments have been carried along with reference to ornamental trees, particularly with the conifers. He has now on hand specimens of the Norfolk Island pine and the Araucaria Bidwellii pines which were subjected to this process two months ago, and they are now two feet high, or equivalent to two years' ordinary growth, and when it is noted that trees of that size are worth $2.50 apiece the value of the discovery is apparent to all tree growers. In other words, it is now possible to get the same value for a tree two months' old that it took five years formerly to obtain. The experiments leading to the discovery were conducted at Secretary Lelong's propagating houses, and he has absolutely demonstrated their practicability before making them public to-day.

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The great problem in Wall street is, "What can capitalists do with their money?" They cannot start new industries. They cannot get satisfactory interest on bank deposits. They do not want to hoard their capital. They do not want to invest it abroad. They are absolutely compelled to put it into real estate or into securities. The former, except in the chief cities of the country, is not readily convertible into cash, and its ownership requires constant attention in the taking care of rentals and repairs. Real estate for some years was rather more popular than the issues of corporations, but since confidence has become general, which has been the fact since the Spanish war ended, capital has been going freely into securities.

REPORT FOR MONTH ENDING AUGUST 11, 1899, OF INCORPORATED HAWAIIAN SUGAR COMPANIES.

NAME OF INCORPORATED CO.	Authorized Capital	Par Value, Shares	Number of Shares Authorized	Shares reported as sold past Month	Highest	Lowest	Latest Sale Reported
American S. Co. ($750,000 paid up)	$ 1,500,000	$ 100	15,000				
Ewa Plantation Co	5,000,000	20	250,000	597	$ 30	$ 28	$ 28
Haiku Sugar Co	500,000	100	5 000				
Hawaiian Agricultural Co	1,000,000	100	10,000	29	295	275	295
Hawaiian Sugar Co	2,000,000	100	20,000	77	222½	217½	222½
Hamoa Plant. Co. (not listed)	175,000	100	1,750				
Honokaa Sugar Co	2,000,000	20	100,000	2865	27½	26	27½
Honomu Sugar Co	750,000	100	7,500	252	160	160	160
Hawaiian Com. Sugar Co*	10,000,000	100	100,000				
Hutchinson S. Plant. Co*	2,500,000	50	50,000				
Hakalau Sugar Co*	1,000,000	100	10,000				
Hana Plantation Co*	5,000,000	100	50,000				
Kilauea Sugar Co*	2,000,000	50	40,000				
Kahuku Plantation Co	500,000	100	5,000				
Kihei Plantation Co. ($1,500,000 paid up	3,000,000	50	60,000	210	42½	40	42½
Koloa Sugar Co	300,000	100	3,000				
Kipahulu Sugar Co	160,050	100	1,600				
Kona Sugar Co, ($180,000 paid up)	500,000	100	5,000	10	29	29	29
Maunalei S Co, ($100,000 paid up)	1,000,000	100	10,000	35	15	14	14
McBryde Sugar Co	5,000,000	20	250,000	10151	3	2½	2⅞
Nahiku Sugar Co	750,000	20	37,500				
Oahu Sugar Co	2,400,000	100	24,000	350	183½	180	180
Onomea Sugar Co	1,000,000	100	10,000				
Ookala Sugar Co	500,000	20	25,000	445	22½	21¼	22
Olowalu Sugar Co	150,000	100	1,500				
Olaa Sugar Co	5,000,000	20	250,000	1568	1	6-10	6-10
Paauhau Plantation Co*	5,000,000	50	100,000		40½	39	40
Pacific Sugar Mill	500,000	100	5,000	8	290	290	290
Paia Plantation Co	750,000	100	7,500				
Pepeekeo Sugar Co	750,000	100	7,500				
Pioneer Mill Co	2,000,000	100	20,000	110	282½	275	275
Wailuku Sugar Co	700,000	100	7,000				
Waianae Sugar Co	300,000	100	3,000				
Waialua Agricultural Co. ($1,500,000 paid up)	3,500,000	100	35,000	160	150	145	145
Waimanalo Sugar Co	252,000	100	2,520				
Waimea Sugar Mill Co	125,000	100	1,250				

* Incorporated in California. Sales in San Francisco reported.